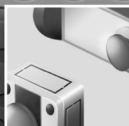
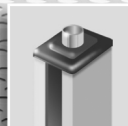
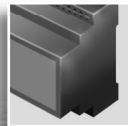
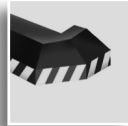
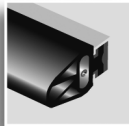
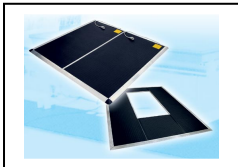


SURROUND YOURSELF with SAFETY

TECHNICAL DOCUMENTATION



SAFETY MATS

The sensitive mat is a safety component, featuring an electro-pressure sensible element to detect the presence of people. The presence of people over 35 kg closes a contact inside the sensor.

The state change of the internal sensor (NO to NC) is processed by the control unit "control device" that sends a machine stop signal and eliminates the danger situation.

HOW TO DIMENSION A MAT

The minimum distance of the dangerous zone must be calculated using the general formula

$$S = (K \times T) + C$$

whereas:

S= minimum distance in mm, of the dangerous zone at the point, axis or plan of the detection zone.

K=Constant in mm/s, derived from data on speeds of body approach.

T= Global response time in sec.

C= Supplementary distance in mm, based on the intrusion into the dangerous zone before activating the protection device.

CALCULATION OF MINIMUM DISTANCE FOR SENSITIVE DEVICES INSTALLED ON THE FLOOR

General method

The choice and use of sensitive devices installed on the floor, activated by foot, depend upon the standard "C" appropriate or an evaluation of risks according to EN 1050 if no C standard exists.

Examples of sensible devices installed on the floor include the sensitive mats, sensitive to pressure, and optoelectric protection devices. The minimum distances derived in this point for sensitive devices installed on the floor require that the approaching speed to the dangerous zone is the walking speed. Referring to the risk of bypassing the detection zone, see appendix B (standard Uni EN 999). The minimum distance is calculated according to the formula:

$$S = (1600\text{mm/s} \times T) + (1200\text{mm} - 0,4 H)$$

whereas:

H= Distance over the reference plan, ex. floor, in mm.

Floor installation

In most cases the sensitive device is assembled directly on the floor, i.e. H=0. Therefore, the minimum distance for sensitive devices installed on the floor is calculated according to the formula:

$$S = (1600\text{mm/s} \times T) + 1200\text{mm}.$$

Example

Approaching direction to detection zone.

This minimum distance is calculated according to the formula:

$$S = (K \times T) + C$$

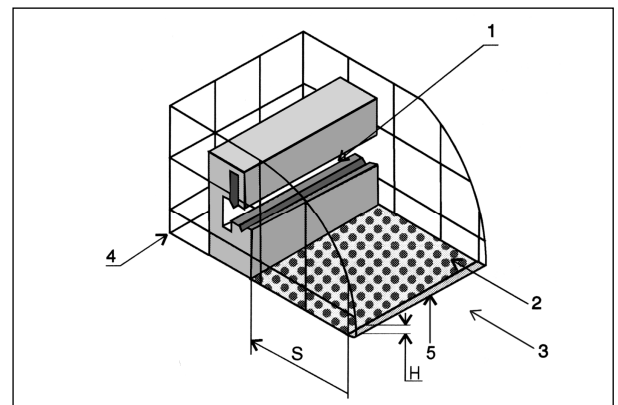
whereas:

K= 1600mm/s

C= 1200mm - 0,4 H, but not less than 850mm, whereas H is the height of the detection zone over the reference plan (ex. floor) in mm.

That is:

$$S = (1600\text{mm/s} \times T) + (1200\text{mm} - 0,4 H)$$



H = Height of measuring zone over reference table.

S = Minimum distance.

1 = Dangerous zone.

2 = Detection zone.

3 = Approach direction

4 = Stationary cover

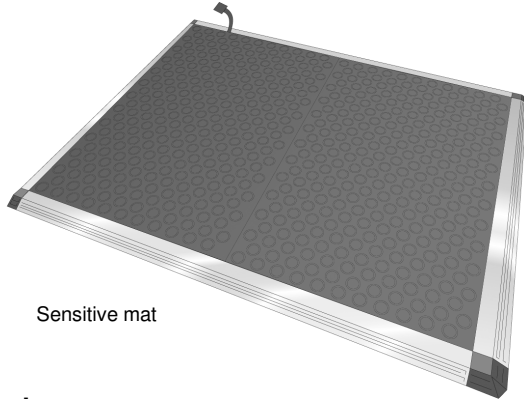
5 = Start of measuring zone

TYPES OF MATS

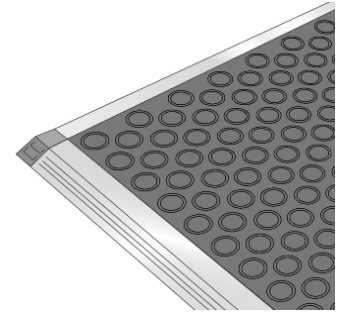
Coating

The mat can be supplied with 2 coatings:

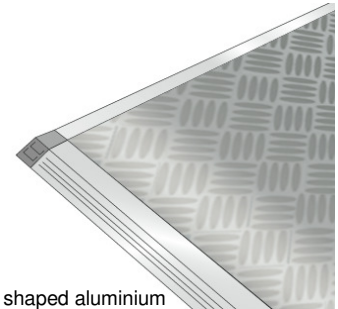
- Black embossed PVC (other colours upon request)
- PVC coated with almond shaped aluminium (ex. machines processing incandescent materials)



Sensitive mat



Embossed PVC



Mandle shaped aluminium

Versions

The mat is available in 2 versions:

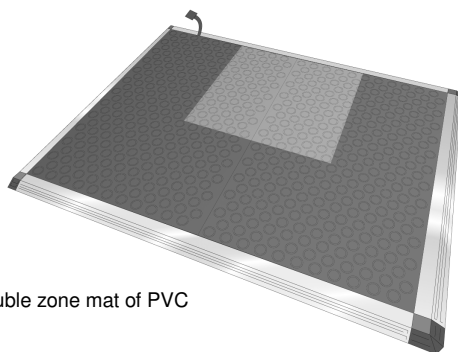
1- "STANDARD MAT"

Dimensions upon request, profiles fastened to the mat, with the possibility of PVC or aluminium coating.

Upon request, the aluminium profiles can be supplied loose, tailor-made.

The PVC coated mat can be implemented with 2 sensitive zones, controlled by 2 separate circuits (ex. opening of a door with the presence of a person, or in front of a bank teller). In this case, if the 2 zones are taken simultaneously, the signals stop the system.

Maximum dimensions of single mat: 3000x1500 mm. You can shape larger surfaces using more mats.



Double zone mat of PVC

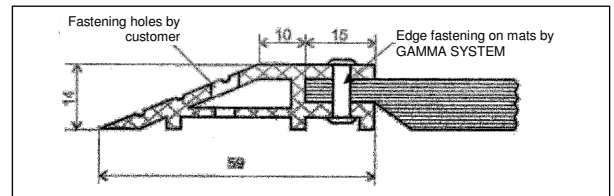
The following profiles are available, to be specified in the order:

For mats with PVC coating:

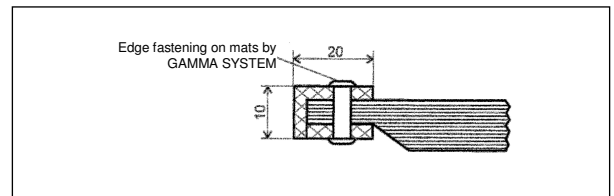
- Type "A" slope profile
- Type "B" 90° profile

For mats with aluminium coating:

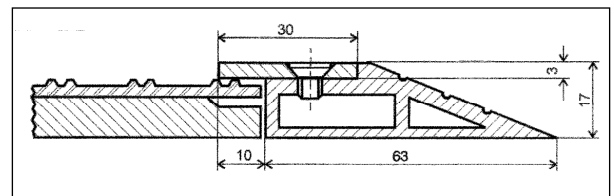
- Type "GSPSA" slope profile
- Type "GSP90A" 90° profile
- Type "GSPCA" profile with cable channel



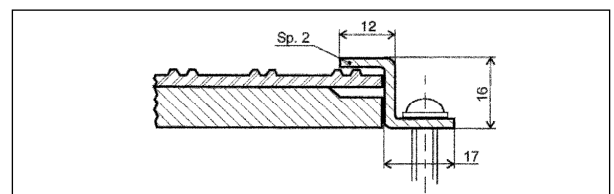
Slope profile type A



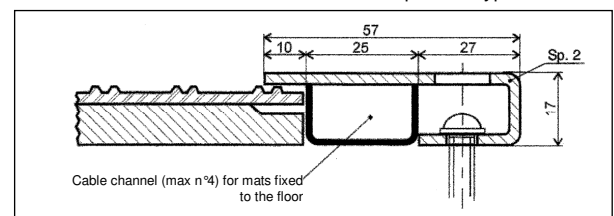
90° profile type B



Slope profile type "GSPSA"



90° profile ° type "GSP90A"

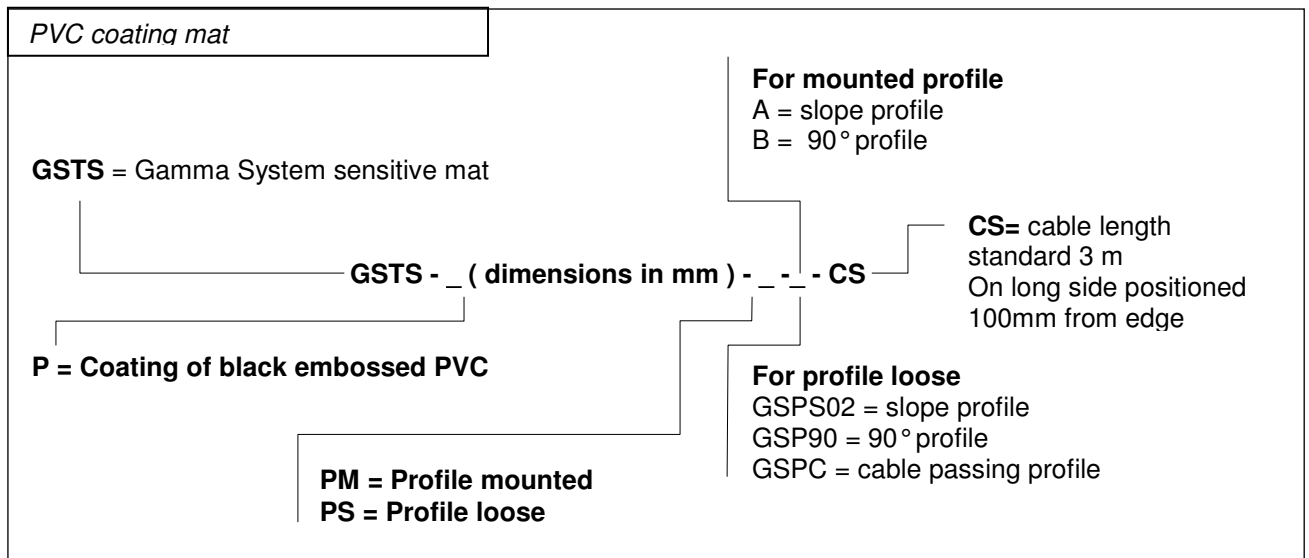


90° profile with cable carrying channel type "GSPCA"

Upon request, the profiles can be supplied loose, tailor-cut. The mat features a 4 pole outlet cable 4*0,35mm² FROR 300/500 standard length m 3.

How to order the standard sensitive mat

The dimension always include the profiles. Always attach a drawing of the mat, indicating the dimensions, profiles and cable outlet position, if different from the standard one.



Example:

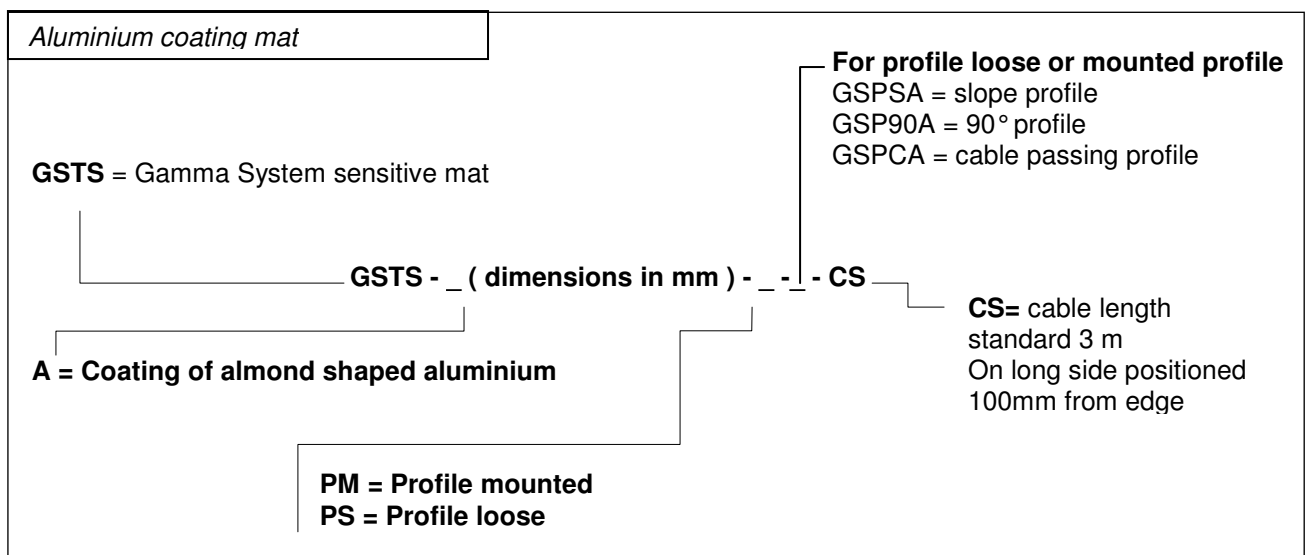
GSTS-P 1000x500-PM-A-CS

(mat coated with PVC 1000x500 slope profile on 4 sides with standard cable outlet).

Example:

GSTS-P 1000x500-PS-GSPS02-CS

(mat coated with PVC 1000x500 profile loose, slope on 4 sides, with standard cable outlet).



Example:

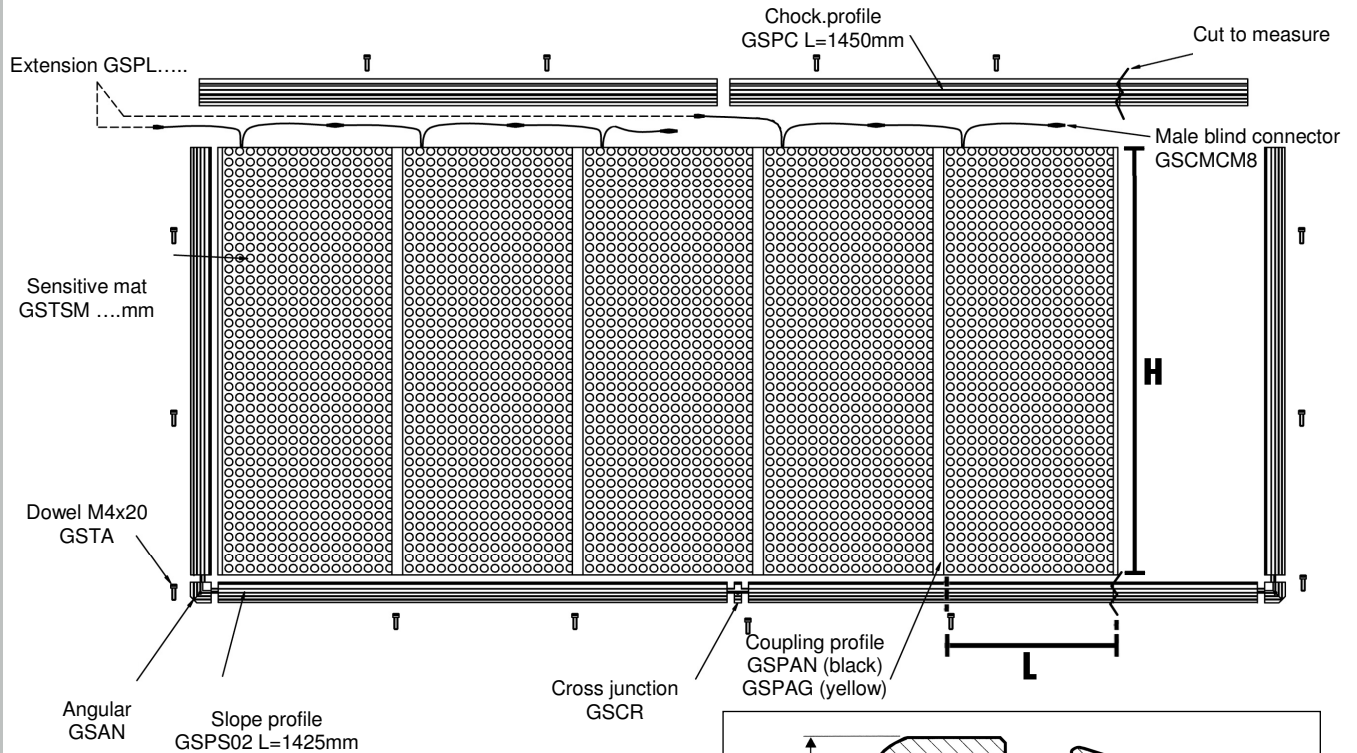
GSTS-A-1000X500-PM-GSPSA-CS

(mat coated with ALUMINUM 1000x500 slope profile on 4 sides, with standard cable outlet).

2- "MODULAR MAT"

PVC coating only, standard dimensions and loose profiles.

Solution of transport, handling and installation problems.



Standard dimensions:

Dimensions: sensible part of mats, profile excluded.

Standard length (H): 1000, 1400, 1600 mm

Standard width (L): 500, 750, 1000 mm

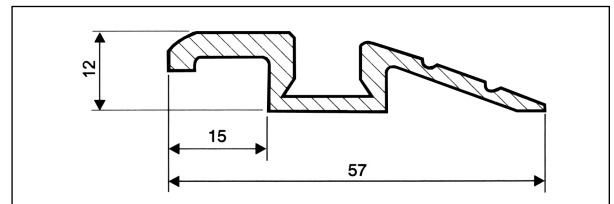
The profiles required to fasten the mat are supplied loose and must be ordered separately.

Four profiles are available:

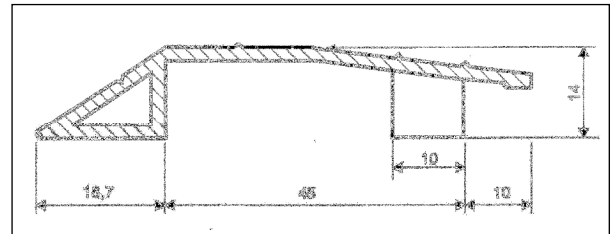
- cod. GSPS02 slope profile L= mm 1425
- cod. GSPC chock profile L= mm 1450
- cod. GSP90 90° profile L= mm 1600
- cod. GSPAN (black) or GSPAG (yellow)
PVC coupling profile of 2 mats L= mm 1600

The supply must include:

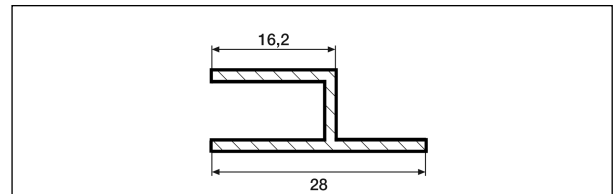
- cod. GSCR cross junction (pack of 5 pcs)
- cod. GSAN angular (pack of 3 pcs)
- cod. GSTA anchorage dowels (pack of 10 pcs)



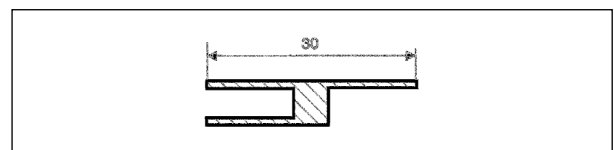
Slope profile cod. GSPS 02



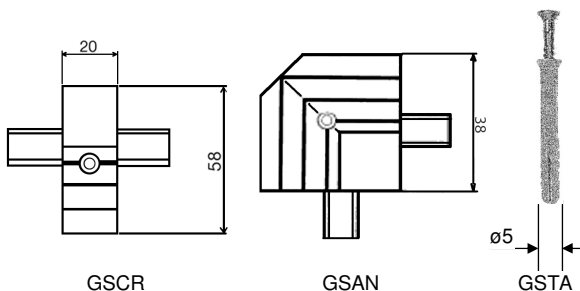
Cable passing profile cod. GSPC



90° profile cod. GSP90



Coupling profile
cod. GSPAN (PVC black)
cod. GSPAG (PVC yellow)



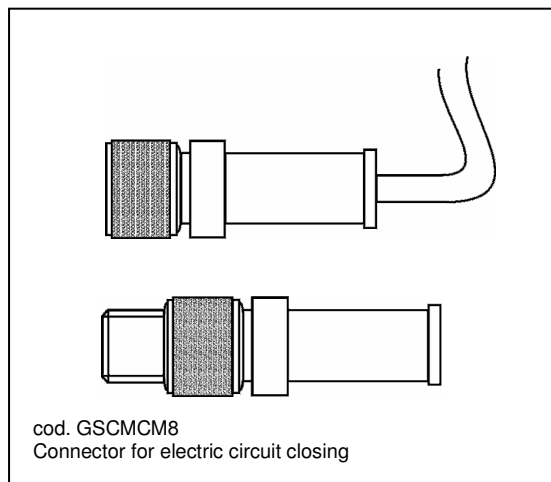
The mat is supplied with 2 outlet cables L=600mm 4 pole 4*0,25mm² CEI IP65 one with die-cast connector M8 MALE and the other with connector M8 FEMALE for series connection of the mats.

Electrical connection between mat and device

For the electrical connection, order an extension with connector M8 FEMALE (cod. GSPL) and an electric circuit closing connector (cod. GSCMC8).

How to order a modular sensible mat

Example of a mat 2 zones, dimensions of the zone to be covered 2500 x 1000 mm (fig. previous page).



GSTSM= Gamma System modular sensitive mat

N° **GSTSM** (dimensions in mm)

Quantity/number of mats

Example:

n. 5 **GSTSM 500X1000 mm**

Edges with relative quantity

- cod. GSPS02 slope profile L= mm 1425
- cod. GSPC chock profile L= mm 1450
- cod. GSP90 90° profile L= mm 1600
- cod. GSPAN (black) or GSPAG (yellow) coupling PVC profile of 2 mats L= mm 1600 (Es. n.04 GSPS02 + n.02 GSPC +n.02 GSPAN + n.01 GSPAG)

Accessories for profiles

- cod. GSCR cross junction (pack of 5 pcs)
- cod. GSAN angular (pack of 3 pcs)
- cod. GSTA anchorage dowels (pack of 10 pcs) (Es. n.01 pack. GSCR + n. 01 pack. GSAN + n. 02 pack. GSTA)

Accessories for electrical connections

- cod. GSCMCM8 male blind connector for circuit closing.
- cod. GSPL...(mm 1000 - 3500 - 5500 - 6500 - 10000) extension of mat connection to safety device (Ex. n. 02 GSCMC8 + n. 02 GSPL3500)

Technical features:

Description	Mat with PVC coating	Mat with aluminum coating
Max.thickness	14 mm	17 mm
Weight/m ²	15 c.a Kg	17 c.a Kg
Operation pressure	< 300 N Ø mm 80 / < 600 N Ø mm 200	
Max load allowed	2000 N / 80 Ø mm	
Response times	< 200 ms with devices Gamma System	
Mech.duration of internal contact	5.000.000 operations	
Max.operating voltage	24 Vcc/ca	
Max.operating current	60 mA / 24 V	
Outlet contact	NA	
Operating temperature	+5 °C + 60 °C	
Protection	IP65	
Chemical resistance	Oil, hydrocarb., diesel	Oil, hydrocarb., diesel, solvents, anti-spark
Reference standard	Tests according to UNI 1760/2	
Safety category	Cat. 2 combined with control units type GP02/E and GP02/E-S2 Cat. 3 combined with control units type GP03 and GP03/S2	

CONTROL UNIT/DEVICE TO CONTROL MATS EDGES AND SHOCK ABSORBERS

The control unit is a device to control the function of a sensor (mat, edge or shock absorber) by blade contacts.

The blade contact is a NO contact that closes, causing the opening of the outlet contact of the control unit.

The control unit controls the operation of the sensor and the connection circuit, and allows to

transform the NO signal of the blade contact into a NC safety signal.

A control device can control several sensors, but cannot perform the auto-diagnose indicating which sensor is faulty. If more sensors are used, use a control unit every 3-4 sensors.

MODELS AVAILABLE:

GP02E
GP02/E-S2
GP03
GP03/S2
GP02R *only edges with electrical resistance 8,2kΩ*

CONTROL UNIT

Description

Emergency stop circuit, used to manage and control a sensor, having two safety relays terminals with forced opening contacts.

The two relays, normally excited, are deenergized in the following conditions:

- No supply
- Operation of mat, edge, shock absorber.
- Internal faults
- Interruption of the internal circuit of mat, edge, shock absorber or connection cables between control unit and sensor (mat, edge, shock absorber).

The devices are supplied with **automatic reset** but they can be transformed into **manual reset**.

If a control unit is used **without rearming** the function must be supplied by the control system of the machine (see std. 594-1 1996).

Operation

Two separate channels detect the voltage at the end of the safety terminals of the mat, and each channel commutes a safety relay with forced opening contacts.

Models GP02/E and GP02/E-S2

The supply voltage is limited by a specific group and the pilot circuit, to avoid short circuit currents whole closing the sensor (mat, edge, shock absorber). The control unit controls itself, as well as any other operation.

Inlet terminals are foreseen for:

- Test signal activating/deactivating the circuit of the control device simulating the operation of the sensor and checking the system efficiency.

- Signal of manual reset/ feedback-action.

The two modules are differentiated by the number of outlet contacts: model GP02/E has a NO safety contact, whereas model GP02/E-S2 has two NO safety contacts.

Models GP03 and GP03/S2

The electronic circuit can detect the trespassing of a resistance threshold and stop the system.

This feature is very important, as it assures the control of a possible damage of the sensors, by internal or external causes. As safety category, both are equal: the difference is that the type GP03/S2 has more outlet contacts. At each upstroke/downstroke cycle of a mat, the device controls itself at each operation.

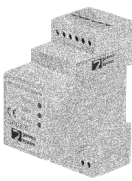
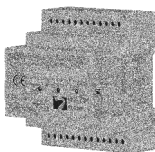
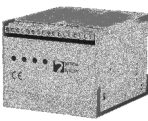
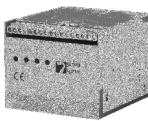

Terminals are foreseen for:

- Signal of "TEST" activating/deactivating the circuits of the control device, simulating the operation of the sensor and checking the system efficiency;
- inlet of back-action contacts for the check of the operation of relays of remote controls used as interface for emergency stops;
- inlet of manual reset.

Model GP02R only for edges with electrical resistance 8,2kΩ

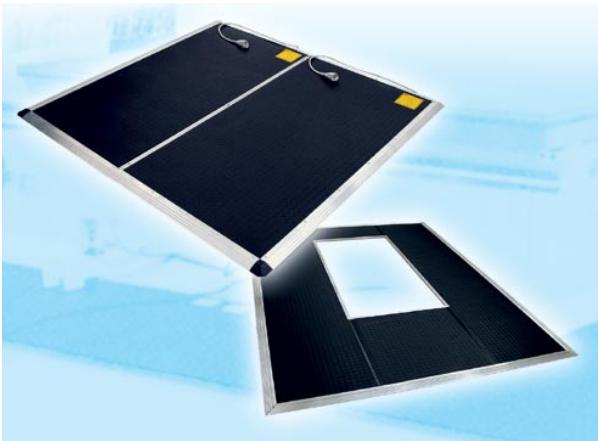
Two symmetric circuits detect the current in the edge, adjusted for a resistance of 8,2 KΩ. When the circuits detect a variation of ± 4 KΩ, caused by a fault or operation of the edge, they desexcite the outlet relays, that open the safety contacts.

Technical features:

Description	GP02/E	GP02/E-S2	GP03	GP03/S2	GP02R (8,2 K Ω)
					
Safety category (EN 954-1)	Cat. 2	Cat. 2	Cat. 3	Cat. 3	Cat. 2
operative mode	With/without re-arming				
Supply voltage	24 V _{cc} \pm 10%		24 V _{cc} / 24 Vac / 110 Vac		24 Vac/cc
Current absorbed	15 mA		30 mA		12 mA
Current absorbed with reset module 24Vdc	90 mA		100 mA		110 mA
Operating temperature	0 ; +55 °C				
Storage temperature	-20 a + 70 °C				
Response time	< 8 msec	< 15 msec	< 14 msec	< 22 msec	< 30 msec
Outlets for safety	Max. 4A 250 Vac	Max. 6A 250 Vac	Max. 4° 250 Vac	Max. 6A 250 Vac	Max 6A 250 Vac
Protection of outlet contacts	4A fast 2A delay	6A fast 4A delay	4A fast 2A delay	6A fest 4A delay	6A fast 4A delay
Safety outlets ⁽¹⁾	1NA	2NA	1NA	2NA+1NC	2NA
Auxiliary outlets of signals ⁽¹⁾	1NA				
Outlets of signals	Max 0,5 A 125 Vac		-	-	
Mechanical lifetime	10.000.000 operations				
Voltage applied	24 Vdc				
Max. length of connections	100 m (cable 1 mm ²)				
Max. resistance of sensor and threshold	20 ohm		100 ohm		8,2 K Ω 4-12 K Ω
Max. controllable surface	5 m ² (mats) 12m (edges)		10 m ² (mats) 20m (edges)		20 m (edges)
Section of connection cables	4x0,35 mm (for L>20m use cable section 1 mm ²)				
Protection of container	IP30				
Terminal protection	IP20				
Assembly	Guide omega 35 mm (EN50022)				
Dimension of container	35x90xh70 mm	72x90xh70 mm	75x90xh105 mm		99x22xh114 mm
Weight	150 g	230 g	255 g	295 g	135 g
Material of container	PPO auto-extinguishing				PA 66 -FR
Sensors to be used and safety category	SENSITIVE MATS, EDGES, SHOCK ABSORBERS cat. 2		SENSITIVE MATS, EDGES, SHOCK ABSORBERS cat. 3		RESISTIVE .EDGE Cat. 2

(1) Contact closed with sensor supplied, not operated

EXAMPLES



EXAMPLES

10044 Pianezza – TO – Via Torino, 24/I – ITALY
Tel. +39 011 968 24 66 r.a. – Fax +39 011 967 42 11
e-mail: info@gammasystem.com
www.gammasystem.com

 **INRATO**
International
Tel.: +31(0)527 785 781
Fax: +31(0)527-785 295
Email: info@inrato.com
Web: www.inrato.com

 **gamma
system**